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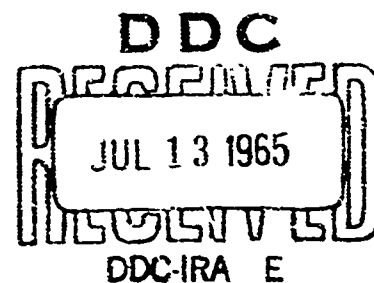
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THE EFFECT OF CERTAIN PHYSICAL FACTORS ON THE CAUSATIVE  
AGENTS OF SOYBEAN SEED BACTERIOSES

TRANSLATION NO. 1122

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THE EFFECT OF CERTAIN PHYSICAL FACTORS ON THE  
CAUSATIVE AGENTS OF SOYBEAN SEED BACTERIOSES

[Following is the translation of an article by  
M. V. Krasnova in the Ukrainian-language periodical  
Mikro-biologichnyy Zhurnal (Microbiology Journal),  
Vol 25, No 5, 1963, pages 50-52.]

The soybean, as a plant with a high content of proteins in its seed and green matter, is rapidly becoming very important; but its harvests are still comparatively low, one of the reasons for this being that the above-ground organs of the soybean (cotyledons, leaves, stems, beans, seeds) are greatly affected by bacterioses.

These bacterioses are very widespread and the damage from them is high, and it is therefore very important to study the biology of these inciting agents and to develop means of combating them. Among the other ways of ridding the soybean of bacterioses physical methods of treating the planting seed are of definite interest. These methods have been under recent study and have still found no noticeable application.

Physical methods of ridding soybean seed of bacteriosis inciters are to the point because these bacteria get into the seed where it is impossible to destroy them completely by chemical agents.

Of the physical agents for treating soybean seed ultrahigh frequencies, electric current, and ultrasound have been applied. Experiments were conducted on plantings of soybean variety 9186 belonging to the Department of Seed Culture of the All-Union Scientific Research Institute of Oil and Volatile Oil Crops (Krasnodar).

Irradiation of Seed with Ultrahigh Frequencies. Seed affected by bacteriosis inciters was irradiated on a 30 Mc IGE-3B oscillator at 3000 v.

At the tested UHF irradiation exposures and post-irradiation seed temperature the germinating power of the seed was not as a rule decreased.

Ultrahigh frequency irradiation had a specific effect on the bacteriosis inciters. Thus, the activity of the inciting agent of cotyledon bacteriosis was stimulated thereby, and in this connection the injury to the soybean by this form of bacteriosis increased. On the contrary the effect of irradiation on fine angular leaf spot was drastically depressing, and the result was a decrease in the appearance of the external signs of this leaf bacteriosis. It is probable that with further experimentation it will be possible to discover conditions which will be of practical importance.

Table 1. Bacteriosis Affection of Plants Grown from UHF-Irradiated Seeds of the Soybean

1) Варіанти досліду	2) Схожість насіння	3) Кількість хворих рослин (в %)	
		4) бактеріозом сім'ядолей	5) дрібною кутастою плямистістю листя
6) Опромінювання протягом 80 сек.; струм мережі 0,02; анодний—0,8; температура 41° . . . . .	23,8	57,5	2,5
7) Те ж, але струм мережі 0,025; анодний — 0,75; температура 51° . . . . .	13,5	73,5	0,0
8) Те ж, але струм мережі 0,03; анодний 0,7; температура 61° . . . . .	1,4	100,0	0,0
9) Опромінювання протягом 180 сек., струм мережі—0,06; анодний—0,37; температура 32° . . . . .	26,2	76,1	4,5
10) Те ж, але струм мережі — 0,02; анодний — 0,78; температура 81° . . . . .	2,4	75,0	0,0
11) Опромінювання протягом 20 сек.; струм мережі 0,32; анодний—0,6; температура 60° . . . . .	16,1	85,2	3,7
12) Насіння не опромінювали (контроль) . . . . .	23,4*	56,1	35,1

13) \* Польова схожість насіння при однорічному зберіганні знаходиться в межах 70%.

Legend: (1) Experimental modification; (2) Seed germinating power; (3) Percentage of diseased plants; (4) Cotyledon bacteriosis; (5) Fine angular leaf spot; (6) Irradiated for 80 sec, grid current 0.02, anode current 0.8, temperature 41°; (7) Same, but grid current 0.025, anode current 0.75, temperature 51°; (8) Same, but grid current 0.03, anode current 0.7, temperature 61°; (9) Irradiated for 180 sec, grid current 0.06, anode current 0.37, temperature 32°; (10) Same, but grid current 0.02, anode current 0.78, temperature 81°; (11) Irradiated for 20 sec, grid current 0.32, anode current 0.6, temperature 60°; (12) Seed not irradiated (control); (13)\*Field germinating power of seed kept a year is within 70%.

Electric Current Treatment of Seed. Soybean seed was treated with a high-tension electric current in the All-Union Scientific Research Institute of Agricultural Electrification.

It was ascertained that the higher the voltage of the electric current and the longer the exposure of the seed to treatment, the more effectively it was disinfected from the bacteriosis inciter (Table 2). There was no decrease in seed germinating power in all the experimental modifications as compared to the control.

Table 2. Cotyledon Bacteriosis Affection of Soybean Plants Grown from Seed Treated with Electric Current

1) Варіанти досліду	2) Кількість хворих рослин	3) Інтенсивність ураження (в %)
4) Насіння не обробляли (контроль)	22,1	5,9
5) Насіння обробляли електричним струмом 2 квт/г; експозиція 30 сек.	12,8	3,4
6) Те ж, але експозиція 120 сек.	10,3	2,6
7) Насіння обробляли електричним струмом 4 квт/г; експозиція 30 сек.	8,6	2,0

Legend: (1) Experimental modification; (2) Number of diseased plants; (3) Percentage of affection; (4) Untreated seed (control); (5) Seed treated for 30 sec with electric current of 2 kw-hr; (6) Same, but for 120 sec; (7) Seed treated for 30 sec with electric current of 4 kw-hr.

Ultrasound Treatment of Seed. Soybean seed was subjected to the action of ultrasound in an UZG-1.5 ultrasound apparatus at 21.3 Mc.

It turned out that plants grown from this seed were considerably less affected by all forms of bacteriosis than were the controls. It was moreover demonstrated that the longer the ultrasound acted on the seed, the less the plants that grew therefrom were affected by bacterioses. Ultrasound treatment of the seed was not observed to lower its germinating power.

Table 3. Bacteriosis Affection of Soybean Plants Grown from Ultrasound-Treated Seed.

1) Варіанти досліду	2) Кількість уражених рослин в %		
	3) бактеріозом сім'ядолей	4) кутастою плямистістю листя	5) іржаво-бурою плямистістю
6) Насіння не обробляли (контроль) . . . . .	30,8	73,2	80,2
7) Те ж, але насіння вимочували у воді на протязі 15 хв. . . . .	27,6	73,8	89,7
8) Насіння обробляли ультразвуком, експозиція 5 хв. . . . .	21,7	63,5	66,7
9) Те ж, але протягом 10 хв. . . . .	21,5	45,5	68,5
10) Те ж, але протягом 15 хв . . . . .	16,5	40,4	60,3

Legend: (1) Experimental modification; (2) Percentage of affected plants; (3) Cotyledon bacteriosis; (4) Angular leaf spot; (5) Rusty-brown spot; (6) Untreated seed (control); (7) Same, but seed soaked in water for 15 min; (8) Seed exposed to ultrasound for 5 min; (9) Seed exposed to ultrasound for 10 min; (10) Seed exposed to ultrasound for 15 min.

Therefore treatment of soybean seed with UHF, electric current, and ultrasound helps to disinfect it.

In some experimental modifications a positive effect of these physical agents on soybean seed germinating power is observed along with their disinfecting action.

Study of the possible use of physical agents for fighting plant bacteriosis inciters must be continued and broadened.

All-Union Institute of Oil and Volatile Oil Crops (Krasnodar)

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